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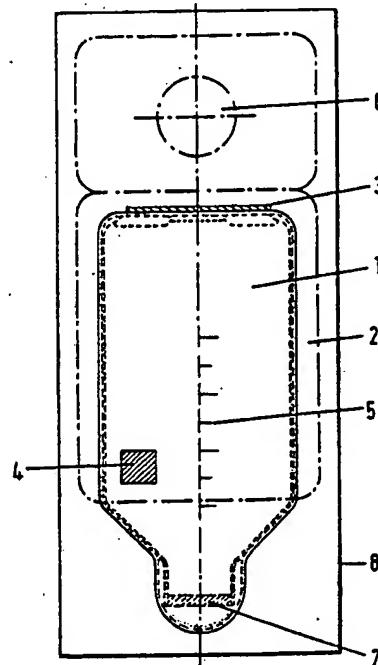
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## (54) A package permitting the prolonged storage of nutrient products

(57) A package for permitting the prolonged preservation of products which must be stored shielded from aerial oxygen, characterized in that it consists of:

- a product containing bottle 1 whose wall is of transparent thermoplastics permeable to oxygen,
- an outer packing 2 which encases the bottle and whose wall is of low permeability to oxygen, and
- an oxygen trap 3 arranged between the outer packing and the bottle. The outer packing consists of 5 to 10 layers of flexible transparent plastics, such as ethylene vinyl alcohol or polyvinylidene chloride, or a combination thereof and the bottle may be enclosed under vacuum within the outer packing. An oxygen indicating capsule may be arranged between the bottle and outer packing.

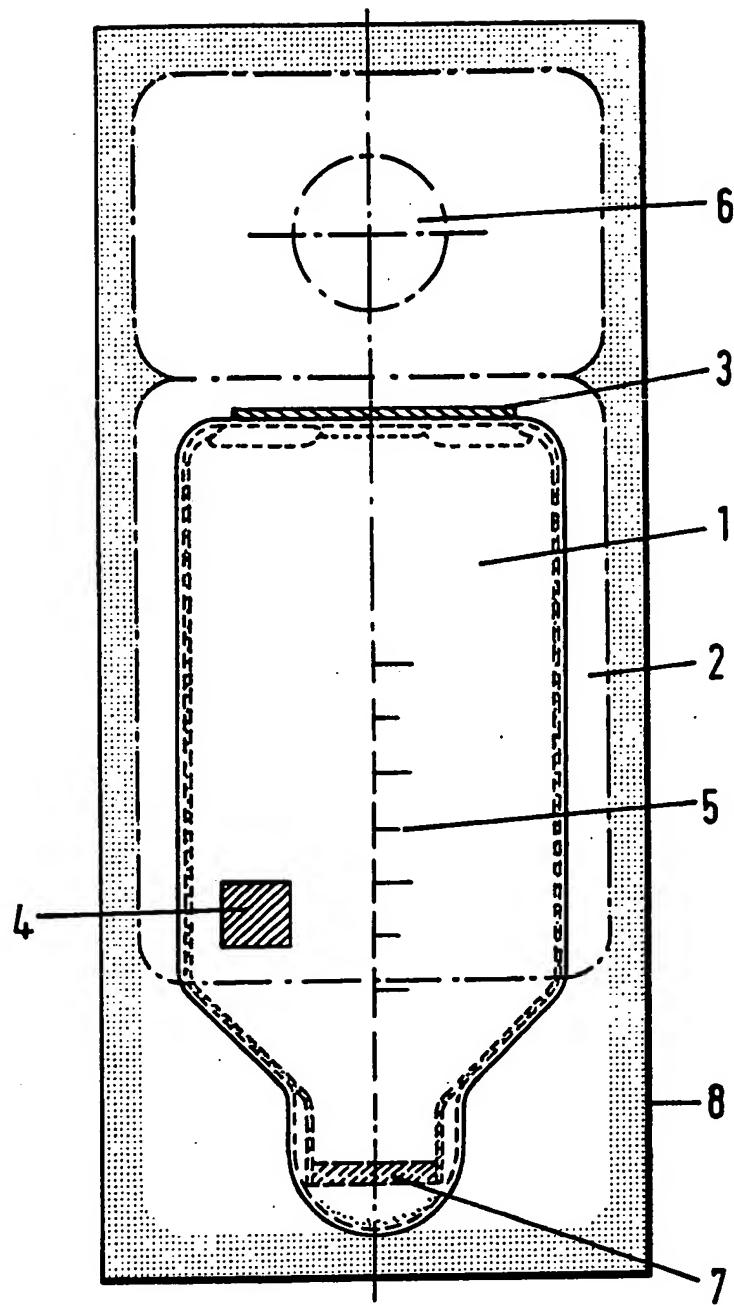


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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DEVICE PERMITTING THE PROLONGED STORAGE OF NUTRIENT PRODUCTS

The present invention relates to a device permitting the prolonged storage of products contained therein.

More especially, it relates to a device permitting the prolonged preservation of products which must be stored shielded from aerial oxygen.

Among these products, special mention may be made of those intended for enteral nutrition.

These products can contain constituents which are degraded in the presence of aerial oxygen. Constituents such as vitamin C or certain lipids, which are usually present in this type of product, are very rapidly oxidised and hence degraded during prolonged storage in the presence of oxygen.

To permit prolonged storage of these products intended for enteral nutrition, it has been necessary to develop a packaging capable of preventing the degradation of the said products. For this purpose, packaging in the form of metal cans is frequently employed, since metal cans possess good impermeability to gases.

However, these packagings do not give complete satisfaction to the users, for example those in hospitals. In effect, with this type of packaging, direct visualisation of the level of the product inside the can is impossible, such visualisation being obtainable only by using additional devices. In point of fact, it is obvious that the ability to monitor readily the level of a product being administered to a patient is of great importance.

In an effort to solve this problem, it has also been necessary to take into account the properties of the packaging materials used and the processes applied, as well as the treatments which the products to be packaged have to undergo, in order to be able to withstand storage.

Taking into account all the requirements of packaging and processes usually employed, the choice of material to be used became directed towards a bottle consisting of a transparent material capable of withstanding a customary process for sterilisation of the product to be

packaged and capable of being easily worked. A material of this kind is, in particular, a thermoplastic material such as low density polyethylene. It may be used alone or in combination with other plastics.

Although a material of this kind satisfies the requirement of transparency and may be easily worked, it may nevertheless have the disadvantage of being permeable to aerial oxygen.

As a result, the product contained in a bottle of this kind becomes very rapidly degraded on account of the oxidation of its constituents, as already mentioned, in particular, in the case of vitamin C and lipids.

The problem of prolonged storage could hence not be solved by the use of this bottle alone.

Among the solutions to this problem which have already been provided, packagings may be mentioned which make use of different mixtures of plastics or different plasticisers which are frequently subjected to special treatments.

Thus, packagings were known which consist, for example, of several superposed layers of different materials or different mixtures of materials, each of these layers being endowed with a particular property. One layer may, for example, form a barrier for oxygen, another layer will be the barrier for moisture, and the like. The production of such multilayer packagings often proves intricate and expensive.

In point of fact, the Applicant Company has developed a new packaging device which is simple and cheap to produce and which meets all the requirements needed in order to be able to store a product for a long period without degradation.

The subject of the present patent application is hence a device permitting the prolonged preservation of products which must be stored shielded from aerial oxygen, characterized in that it consists of:

- a bottle whose wall is permeable to aerial oxygen;
- an outer packing which encases the said bottle and whose wall is of low permeability to aerial oxygen; and
- an oxygen trap arranged between the outer packing and

the bottle. If desired, this device can contain, in addition, an indicator of the presence of oxygen.

The device of the present invention may also be characterized in that:

- The bottle designed to receive the product to be stored is made of a transparent thermoplastic material, and in that the said bottle is capable of withstanding a process for sterilisation of the products to be stored.
- The outer packing which encases the container containing the product to be stored is made of a transparent and flexible thermoplastic material.
- This outer packing consists of one or more superposed layers placed under vacuum around the said bottle.
- The oxygen trap is in the form of a sachet and is placed under vacuum between the said bottle and the said outer packing, and consists of a material capable of trapping residual oxygen or oxygen which may have appeared during storage between the bottle and the outer packing. The presence of this oxygen trap permits stability of the components that are sensitive to oxidation. It enables, in particular, the vitamin contents to be assured, and prevents the oxidation of fatty acids.
- In cases where it is present, the indicator of the presence of oxygen is also arranged between the outer packing and the bottle.

The device of the invention may also be illustrated, by way of example, by following embodiments:

- The transparent thermoplastic material from which the bottle is made is preferably a low- or high-density polyethylene, a polyamide, a polypropylene, a polystyrene, a polycarbonate or a mixture of these products.
- The outer packing encasing the bottle containing the product to be stored preferably consists of 5 to 10 layers of a flexible transparent thermoplastic material such as ethylene vinyl acetate or polyvinylidene chloride, or a combination of these products.
- The encasing of the said bottle with the said outer packing is accomplished by thermoforming, placing the bottle in position and sealing a film flat against the bottle.

- In cases where, in the device of the invention, an indicator of the presence of oxygen is added, the said indicator is in the form of a capsule containing a material capable of changing its appearance in the presence of oxygen.
- The oxygen trap arranged under vacuum between the bottle and the said outer packing is preferably the product known under the brand name AGELESS Z 50 PU®.  
It takes the form of a sachet whose contents trap oxygen.
- The neck of the bottle is made in such a way that it can be connected to a customary system for the discharge and flow of its contents to the subjects being treated.
- The bottom of the bottle can be equipped with a suspension ring.
- The bottle can be provided with information relating to the product contained therein, in the form of a label or card.
- The bottle can bear a graduation indicating the quantity of product contained.
- The outer packing encasing the bottle containing the product to be stored can be provided with a means, such as a hole or a ring, enabling the assembly to be suspended from a bracket during the administration of the said product.
- The neck of the bottle is equipped during storage with a closure which can be easily removed or pierced so as to make it possible to place in position the customary means permitting the flow and administration of product from the bottle.

The subject of the invention is also a process for packing products which must be stored shielded from aerial oxygen. This process comprises filling a bottle whose wall is permeable to oxygen with the said products and enclosing this bottle under vacuum with an outer packing of low permeability to oxygen, and is characterized in that, during the said encasing, an oxygen trap and, if desired, an indicator of the presence of oxygen are placed between the said bottle and the said outer packing. As a variant of this process, it is also possible to incorporate a stage of sterilisation of the bottle containing the product to

be stored before carrying out the encasing of the said bottle under vacuum without the outer packing.

A non-limiting embodiment of the device of the invention is shown in the attached figure.

In this figure:

- 1 - shows the bottle containing a product which must be stored shielded from aerial oxygen,
- 2 - the outer packing encasing the bottle,
- 3 - the oxygen trap,
- 4 - the indicator of the presence of oxygen,
- 5 - the indications of the level of the product in the bottle,
- 6 - a means of suspension in the form of a hole in the outer packing, 2, provided for hanging the assembly, for example on a bracket, during the administration of the product,
- 7 - the closure of the neck of the bottle 1, shown schematically, capable of being pierced or removed when a means providing for the flow and administration of the product from the bottle 1 is placed in position,
- 8 - the film sealed flat against the bottle during the encasing of the bottle 1 with the outer packing.

When the device of the invention is brought into use, the outer packing 2, for example, is torn at the level of the neck of the bottle 1, the closure 7 of the said neck is pierced or removed and a customary device providing for the flow of the product from the bottle 1 and for conveying it to the subject to be treated is then connected.

The assembly is then inverted and suspended, for example from a bracket, and the administration of the product in question is allowed to take place.

The filling of the bottle 1 with the product to be stored and preserved for a long period, as well as the possible sterilisation of the assembly, its encasing under vacuum with the outer packing 2 and the placing in position of the oxygen trap 3 and, if desired, an indicator 4 of the presence of oxygen are accomplished according to known processes.

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It is self-evident that the invention cannot be limited to the embodiment described and presented. It also encompasses all the possible variants not expressly shown.

CLAIMS

1. Device permitting the prolonged preservation of products which must be stored shielded from aerial oxygen, characterized in that it consists of:
  - a bottle whose wall is permeable to oxygen,
  - an outer packing which encases the bottle and whose wall is of low permeability to oxygen, and
  - an oxygen trap arranged between the outer packing and the bottle.
2. Device permitting the prolonged preservation of products which must be stored shielded from aerial oxygen, comprising a bottle whose wall is permeable to oxygen, which bottle is encased by an outer packing of low permeability to oxygen and characterized in that an oxygen trap is incorporated between the said bottle and the outer packing.
3. Device according to either of Claims 1 and 2, characterized in that the bottle is made of a transparent thermoplastic material.
4. Device according to any one of Claims 1 to 3, characterized in that the outer packing is made of a transparent and flexible thermoplastic material.
5. Device according to any one of Claims 1 to 4, characterized in that the outer packing consists of one or more superposed layers and is placed under vacuum around the said bottle.
6. Device according to any one of Claims 1 to 5, characterized in that the oxygen trap is in the form of a capsule which has been placed under vacuum between the said bottle and the said outer packing, which capsule consists of a material capable of trapping oxygen which may have been present or which may have been able to appear inside the said outer packing.
7. Device according to any one of Claims 1 to 6, characterized in that it contains an indicator of the presence of oxygen, which is arranged between the bottle and the outer packing.

8. Device permitting the prolonged preservation of products which must be stored shielded from aerial oxygen substantially as herein described with reference to the accompanying drawing.
9. Process for packing products which must be stored shielded from aerial oxygen, the said process comprising filling a bottle whose wall is permeable to oxygen with the said products and encasing this bottle under vacuum with an outer packing of low permeability to oxygen, and characterized in that, during the said encasing, an oxygen trap and, if desired, an indicator of the presence of oxygen are placed between the bottle and the outer packing.
10. Process as claimed in claim 9 substantially as herein described.
11. A product when packed by a process as claimed in claim 9.